

APPLICATION FOR UNITED STATES LETTERS PATENT

**TITLE: HANDLE TUBE AND CYCLONE VACUUM CLEANER
EQUIPPED WITH THE SAME**

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HANDLE TUBE AND CYCLONE VACUUM CLEANER EQUIPPED WITH THE SAME

Field of the Invention

5 The present invention relates to a handle tube and a vacuum cleaner equipped with the handle tube, and in particular, to a handle tube installed with a cyclone dust collector and a vacuum cleaner equipped with the handle.

Background of the Invention

10 A vacuum cleaner is an appliance for clearing away dust and soil on a surface to be cleaned, wherein air is forcibly circulated by rotating a motor, so that the interior of the cleaner body is turned into the vacuum state, and the dust and soil are inhaled into the appliance together with the suctioned air due to intense wind run caused by the pressure difference generated between the inner side and outer side of the body of the
15 appliance, whereby the dust and soil are cleared away.

 Further, a cyclone dust collector is an apparatus for separating particles from a fluid with centrifugal force. Due to the advantage of simple construction and durability against high temperature and pressure, such a cyclone dust collector has been widely used from long ago in industrial field and is also employed in a vacuum
20 cleaner.

 A representative example of a cyclone provided with a cyclone dust collector is disclosed in Korean patent application No. 1999-20704 entitled "Cyclone Dust Collector for Vacuum Cleaner," which is pending in the name of the assignee of the present application.

Fig. 1 is a perspective view showing a vacuum cleaner with a cyclone dust collector disclosed in the above-mentioned patent application.

As can be seen from the drawing, the conventional vacuum cleaner 1 equipped with a cyclone dust collector 21 comprises: a cleaner body 3, a flexible hose 9
5 connected to the cleaner body 3, an extension tube 8, a handle tube 7 connected between the flexible hose 9 and the extension tube 8, and a cyclone dust collector 21 joined between the handle tube 7 and the extension tube 8.

The cleaner body 3 is divided into a dust collection chamber (not shown), within which a dust bag (not shown) is received, and a load driven chamber (not shown),
10 within which a suction motor (not shown) for inhaling air that contains external dusts into the dust collection chamber is received.

The distal end of the extension tube 8 is joined with a brush 10 and the brush 10 is constructed to contact a to-be-cleaned-surface as a floor covered with laminated paper, and a carpet in which the bottom side of the brush 10 is formed with an inflow opening.

15 The cyclone dust collector 21 is joined between the handle tube 7 and the extension tube 8 and separates soil such as dust contained in air with centrifugal force.

The handle tube 7 is provided with a handle 9 in a side thereof so that a user can easily grip the handle tube 7.

With the above-mentioned construction, when the source of electric power is
20 applied, air that contains soil such as dust is inhaled through the inflow opening of the brush 10 due to the suction force produced by driving the suction motor. Air flows along the extension tube 8 and into the cyclone dust collector 21. Soil with a large grain size or paper scraps are separated from air by centrifugal force, while air flowing into the cyclone dust collector 21 is forming swirling air streams and moving toward the

closed end of the cyclone dust collector. The separated soil and the like, descends along the internal wall of a soil collection receptacle 25 and are collected in the lower part of the receptacle.

The purified air moves along the handle tube 7 and the flexible hose 9
5 connected between the handle tube 7 and the cleaner body 3 and then flows into the cleaner body.

The processes for entraining and collecting dusts performed in the dust collection chamber (not shown) of the cleaner body are the same with those performed in the conventional air cleaner 1.

10 However, in such a conventional vacuum cleaner, it is required to separately provide a handle to the handle tube, and in particular, when a cyclone dust collector is provided, the load of the handle tube is unevenly concentrated toward the cyclone dust collector. Therefore, it is difficult to smoothly move the vacuum cleaner, including the handle tube.

15 In addition, in such a conventional cleaner, the suction driving force of the cleaner body follows a long transfer route including the brush, the extension tube connected to the brush, the cyclone dust collector, the handle tube connected to the cyclone dust collector, and the flexible hose connected between the handle and the cleaner body, whereby the driving force partially vanishes. Therefore, there is a
20 problem in that the dust collection capability of the cyclone dust collector is reduced.

SUMMARY OF THE INVENTION

Accordingly, the present invention solves the above-mentioned problems occurring in the prior art, and an object of the present invention is to provide a handle

tube for a vacuum cleaner, which is simple in construction and easy for a user to grip when cleaning is performed, and, to provide a vacuum cleaner equipped with the handle tube.

Another object of the present invention is to provide a light-weighted handle
5 tube for a vacuum cleaner, which is provided with a handle-shaped air flow passage, whereby, a separate handle is not needed, and to provide a vacuum cleaner equipped with the handle tube.

Yet another object of the present invention is to provide a handle tube for a vacuum cleaner provided with a handle-shaped air flow passage which is in turn
10 provided with a cyclone dust collector, and to provide a vacuum cleaner equipped with the handle tube.

In order to achieve the above objects, according to the present invention, there is provided a vacuum cleaner including a brush capable of inhaling air that contains external dusts, and a cleaner body for supplying suction force to the brush, wherein the
15 vacuum cleaner further comprises a handle tube interposed between the brush and the cleaner body to interconnect the brush and the cleaner body so that air is capable of flowing through the handle tube, wherein, a predetermined part of the handle tube is formed as a handle to be gripped by a user.

In addition, it is advantageous that the handle is double-bent between a distal
20 end to be connected to the brush and a proximal end to be connected to the air cleaner, wherein, a knurled part is preferably formed on the external surface of the handle.

The vacuum cleaner may further comprise a cyclone dust collector installed in the handle tube.

In addition, the cyclone dust collector preferably comprises: a cyclone body that renders air flowing within the handle tube to swirl, centrifugally separate and discharge dusts; and, a soil collection receptacle for collecting centrifugally separated dusts, the receptacle being removably joined to the cyclone body.

5 It is preferable that the cyclone body comprises: a suction port, through which air that contains dusts and flows into the handle tube, is caused to swirl; a discharge port for discharging dusts-separated air; and, a grill joined to the discharge port for removing soils.

In addition, in order to achieve the above objects, according to the present
10 invention, there is provided a handle tube for a vacuum cleaner, interposed between a brush capable of inhaling air that contains external dusts and a cleaner body for supplying suction force to the brush, wherein an air flow passage for interconnecting the brush and the cleaner body is formed as a handle capable of being gripped by a user.

It is preferable that the handle tube for a vacuum cleaner further comprises a
15 cyclone dust collector.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and advantages of the present invention will be more apparent from the following detailed description taken with reference to
20 the accompanying drawings, in which:

Fig. 1 is a perspective view of a conventional vacuum cleaner provided with a cyclone dust collector according to the prior art;

Figs. 2 is a side view of a handle tube for a vacuum cleaner according to the present invention, wherein the handle tube is equipped with a cyclone dust collector;

and

Fig. 3 is a cross-sectional view of the handle tube shown in Fig. 2.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 As described below, the preferred embodiments will be described in more detail with reference to the accompanying drawings. In the following description of the embodiment of the present invention, like reference numerals will be provided for the elements having same constructions and functions as the conventional image-forming device as described above.

10 Fig. 2 is a side view of a handle tube for a vacuum cleaner, wherein the handle tube is equipped with a cyclone dust collector. In particular, the handle tube shown in Fig. 2 has a construction improved in such a manner that a flow passage of the handle tube is shaped to take a form of handle, whereby a separate handle is not needed and the handle tube is light-weighted.

15 The cleaner equipped with the handle tube that includes the cyclone dust collector comprises: a brush 10; a cleaner body 3; a flexible hose 9 interconnecting the brush 10 and the cleaner body 3; the handle tube 7 installed between flexible hose 9 and the brush 10; and, an extension tube 8 having a distal end connected to the brush 10 and a proximal end connected to the handle tube 7. Because the cleaner body 3, the
20 flexible hose 9, the extension tube 8, and the brush 10 are similar to those indicated in Fig. 1, they are not shown in Fig. 2.

The cleaner body 3 is divided into a dust collection chamber (not shown) provided within the cleaner body 3 and receiving a dust bag (not shown), and a load driven chamber (not shown) housing a suction motor (not shown) for inhaling air that

contains external dusts into the dust collection chamber.

The distal end of the extension tube 8 is joined with the brush 10 and the brush 10 contacts with a to-be-cleaned-surface such as a floor covered with laminated paper or a carpet, in which the bottom side of the brush 10 is formed with an inflow opening.

5 A predetermined part of the handle tube 7 is formed with a handle 60 to be gripped by a user, so that the user can easily grip the handle tube 7.

The handle tube equipped with the cyclone dust collector is described with reference to Fig. 3. Fig. 3 is a cross-sectional view showing the mounting construction of the cyclone dust collector. In the drawing, reference symbol I indicates the front
10 side of the handle tube.

The handle tube 7 comprises a cyclone dust collector 21 mounted on the handle tube 7, and a handle tube body 30.

The handle tube body 30 comprises a first flow conduit 39 and a second flow conduit 41, wherein the first and second flow conduits 39, 41 are located in an upper
15 part and a lower part in reference to a block wall 53 in the handle tube body 30.

The first flow conduit 39 is provided with an air inlet 35 communicating with the brush 10 in the front of the handle tube 7, and a suction port 37 connected to a side of the cyclone dust collector 21 in the rear of the handle tube 7.

The second flow conduit 41 is provided with an air outlet 47 communicating
20 with the flexible hose in the rear of the handle tube 7, the air outlet 9, and a discharge port 43 connected to the cyclone dust collector 21 in the front of the handle tube 7.

The second flow conduit 41 is formed in a double-bent construction so that a handle space 65 is formed entirely under the handle tube 7 to allow a user to easily grip the handle tube 7.

Furthermore, the second flow conduit 41 is backwardly spaced from a soil collection receptacle 25 so that the soil collection receptacle 25 can be removably attached to the cyclone body 55. The distance 'd' between the rear end of the soil collection receptacle 25 and the second flow conduit 41 is determined so that the soil
5 collection receptacle 25 is easily attached to or detached from the handle tube 7.

A knurling may be formed on the outer surface of the handle 60 so that the user can securely hold the handle tube 7 without having the handle tube 7 slip. Alternatively, a series of folds or ridges may be partially formed on the outer surface of the handle 60 in various shapes.

10 The cyclone dust collector 21 includes a cyclone body 55 as well as the soil collection receptacle 25 removably attached to the cyclone body 55.

The cyclone body 55 comprises a suction port 37 for inhaling the air, through which air that contains dusts and flows into the handle tube 7, is caused to swirl; a discharge port 43 for discharging air after the dusts are centrifugally separated; and, a
15 soil separation grill attached to the discharge port 43 and formed with a plurality of fine passage holes 44.

It is preferable that the cyclone body 55 takes a cylindrical shape corresponding to the shape of the soil collection receptacle 25.

The soil separation grill 70 has a cylindrical shape with the plural fine passage
20 holes 44 formed in the circumference, and an opening 45 formed in an end of the grill. The opening 45 serves to discharge air flowing into the soil separation grill 70 through the fine passage holes 44.

In addition, an anti-backflow member 50 is extended from the soil separation grill 70 toward the bottom of the soil collection receptacle 25.

When a source of electric power is applied to the handle tube with the above-mentioned construction, air that contains soils such as dusts are inhaled through the air inlet formed in the brush 10 by suction force generated by the driven suction motor. Thereafter, air flows into the inside of the cyclone dust collector 21 via the extension
5 tube 8 connected with the brush 10.

Air flowing into the inside of the cyclone dust collector 21 flows into the inside of the cyclone dust collector 21 in the oblique direction through the suction port 37 formed in the cyclone body 55. Thereby, air that contains soils such as dust, forms whirling air streams and starts to move toward the closed end of the cyclone dust
10 collector 21.

During this process, the soils of large grain sizes or paper scraps contained in air are separated from air by centrifugal force. The separated soils descend along the inner wall of the soil collection receptacle 25 of the cyclone dust collector 21 and are collected in the lower part of the cyclone receptacle 25. The processes for entraining
15 and collecting dusts performed in the duct collection chamber (not shown) in the cleaner body 3 are similar to those performed in the conventional vacuum cleaner 1.

In the embodiments described above, description is made in connection with a handle tube provided with a cyclone dust collector and a vacuum cleaner equipped with the handle tube. However, there is no doubt that the present invention can be variantly
20 embodied as a handle tube only having a handle without a cyclone dust collector and a vacuum equipped with such a handle tube.

According to the present invention as described above, it is not needed to provide a separate handle to the handle tube, and thus it is possible to use a simple and light-weighted handle tube. Therefore, the vacuum cleaner can be conveniently used.

Furthermore, the route for transferring the suction driving force from the suction motor in the cleaner body can be reduced. Therefore, the dust collection capability of the vacuum cleaner can be enhanced.

While the preferred embodiments of the present invention has been shown and
5 described with reference to the preferred embodiments thereof, the present invention is not limited to the embodiments. It will be understood that various modifications and changes can be made by those skilled in the art without departing from the spirit and scope of the invention as defined by the appended claims. It shall be considered that such modifications, changes and equivalents thereof are all included within the scope of
10 the present invention.